

WHAT IS CLAIMED IS:

1. A moldable composition comprising (a) a bone cement material selected from the group consisting of an organic bone-cement dough, an inorganic bone-cement dough, and a composite bone-cement dough; and (b) an anti-resorptive amount of an anti-  
5 resorptive agent.

2. The composition of claim 1, wherein the anti-resorptive agent is selected from the group consisting of a bisphosphonate, a pharmaceutically acceptable salt or ester thereof, a salt of a Group IIIA element, a cholesterol lowering agent, and an estrogen-  
10 bisphosphonate conjugate.

3. The composition of claim 1, wherein the bone-cement dough is an acrylic bone-cement dough or a hydroxyapatite bone-cement dough.

15 4. The composition of claim 1, wherein the anti-resorptive agent is a gallium salt selected from the group consisting of gallium nitrate, gallium chloride, gallium fluoride, gallium sulfate, and gallium citrate.

20 5. The composition of claim 1, wherein the bone-cement dough is an acrylic bone-cement dough and the anti-resorptive agent is a bisphosphonate selected from the group consisting of pamidronate, etidronate, and alendronate or a pharmaceutically acceptable salt or ester thereof.

25 6. The composition of claim 5, wherein the acrylic bone-cement dough comprises polymethyl methacrylate.

7. The composition of claim 1, wherein the anti-resorptive agent is on a surface of the bone-cement dough.

30 8. The composition of claim 1, wherein the anti-resorptive agent is impregnated in the bone-cement dough.

35 9. A moldable composition comprising (a) a bone-cement dough selected from the group consisting of an organic bone-cement dough, an inorganic bone-cement dough,

and a composite bone-cement dough and (b) an anti-resorptive amount of a proteinaceous or a hormonal anti-resorptive agent.

10. The composition of claim 9, wherein the anti-resorptive agent is on a surface  
5 of the bone-cement dough.

11. The composition of claim 9, wherein the anti-resorptive agent is impregnated in the bone-cement dough.

10 12. The composition of claim 9, wherein the proteinaceous or hormonal anti-resorptive agent is selected from the group consisting of an estrogen, a prostaglandin, and a cytokine.

15 13. A moldable composition comprising (a) a bone-cement dough selected from the group consisting of an organic bone-cement dough, an inorganic bone-cement dough, and a composite bone-cement dough and (b) a pharmaceutically effective amount of a bone-formative agent.

20 14. The composition of claim 13, wherein the bone-formative agent is on a surface of the bone-cement dough.

15 15. The composition of claim 13, wherein the bone-formative agent is impregnated in the bone-cement dough.

25 16. The composition of claim 13, wherein the bone-formative agent is selected from the group consisting of OP-1, BMP-2, BMP-3, BMP-4, LMP-1, and BMP-1.

30 17. An ex-vivo bone graft impregnated with an anti-resorptive amount of an anti-resorptive agent.

35 18. The bone graft of claim 17, wherein the anti-resorptive agent is selected from the group consisting of a bisphosphonate, a pharmaceutically acceptable salt or ester thereof, a salt of a Group IIIA element, a cholesterol lowering agent, a chemotherapeutic agent-bisphosphonate conjugate, and an estrogen-bisphosphonate conjugate.

19. The bone graft of claim 17, wherein the bone is selected from the group consisting of an allogeneic bone graft, an autografic bone graft, or a xenografic bone graft.

20. The bone graft of claim 17, wherein the bisphosphonate is selected from the group consisting of pamidronate, etidronate, and alendronate, or a pharmaceutically acceptable salt or ester thereof.

21. The bone graft of claim 17, wherein the anti-resorptive agent is a gallium salt.

22. The bone graft of claim 21, wherein the gallium salt is selected from the group consisting of gallium nitrate, gallium chloride, gallium fluoride, gallium sulfate, and gallium citrate.

23. A method of making a moldable anti-resorptive bone cement, comprising contacting a bone cement material selected from the group consisting of an inorganic bone-cement dough, an organic bone-cement dough, and a composite bone-cement dough with an anti-resorptive amount of an anti-resorptive agent

24. The method of claim 23, wherein the anti-resorptive agent is selected from the group consisting of a bisphosphonate, a pharmaceutically acceptable salt or ester thereof, a salt of a Group IIIA element, a cholesterol lowering agent, a chemotherapeutic agent-bisphosphonate conjugate, and an estrogen-bisphosphonate conjugate.

25. The method of claim 23, wherein the bone-cement dough is an organic bone-cement dough and the anti-resorptive agent is a bisphosphonate.

26. A method of making a moldable anti-resorptive bone-cement dough, comprising contacting an organic bone-cement dough, an inorganic bone-cement dough, or a composite bone-cement dough with an anti-resorptive amount of a proteinaceous or hormonal anti-resorptive agent or with a pharmaceutically effective amount of a bone-formative agent.

27. A method of making a moldable anti-resorptive bone-cement dough, comprising (a) admixing a polymer component with an anti-resorptive amount of an anti-resorptive agent for form a mixture; and (b) adding a liquid monomer component to the mixture.

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28. The method of claim 27, wherein the polymer component comprises polymethyl methacrylate and the liquid monomer component comprises methyl methacrylate.

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29. A method of making an anti-resorptive bone graft comprising contacting a bone graft selected from the group consisting of an allogeneic bone graft, an autografic bone graft, and a xenografic bone graft, with a fluid vehicle comprising an anti-resorptive amount of an anti-resorptive agent.

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30. The method of claim 29, wherein the anti-resorptive agent is selected from the group consisting of a bisphosphonate, a pharmaceutically acceptable salt or ester thereof, a salt of a Group IIIA element, a cholesterol lowering agent, a chemotherapeutic agent-bisphosphonate conjugate, and an estrogen-bisphosphonate conjugate.

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31. The composition of claim 1, further comprising a chemotherapeutic agent.

32. The composition of claim 31, wherein the anti-resorptive agent is a bisphosphonate.

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33. The composition of claim 32, wherein the chemotherapeutic agent and the bisphosphonate are in the form of a bisphosphonate-chemotherapeutic agent conjugate.

34. The composition of claim 33, wherein the chemotherapeutic agent is doxorubicin or methotrexate.

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35. The composition of claim 34, wherein the bisphosphonate is pamidronate.

36. A method for reducing a bone void in a patient in need thereof, comprising adding to the void an amount of the composition of claim 1 sufficient to reduce the void.

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37. The method of claim 36, wherein the bone cement comprises polymethyl methacrylate and the anti-resorptive agent is a bisphosphonate.

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